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CAMERON STATION, ALEXANDRIA, VIRGINIA



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## Southern Research Institute



2000 NINTH AVENUE SOUTH  
BIRMINGHAM 5, ALABAMA

May 17, 1963

### AIR MAIL

Commanding Officer  
U. S. Army Chemical Research  
and Development Laboratories  
Edgewood Arsenal, Maryland

Attention: Mr. Abraham Koblin  
Contract Project Officer

Reference: Monthly Progress Report  
Contract DA18-108-AMC-32-A

Dear Sir:

The study to develop instruments for measuring concentration and particle size of chemical agents was continued during April. This report gives an outline of the results of the experiments with the electrochemical cells and the aerosol flash camera. Most of these experiments are still in progress and a complete report cannot be made now.

Last month we described some of the changes that have been made to shorten the response time of the electrochemical cell. An average response time of about three seconds was obtained with a new cell. The cell was made with a methyl cellulose gel that was prepared with an oxime solution. The response was measured with a cyanide generator delivering about two micrograms per liter of HCN. The sensitivity was about the same as that of the standard oxime cells that have been used previously. A response time of about six seconds was measured previously with the thin film cell; but evaporation of the electrolyte was a serious problem with this cell. Drying of the gel will be a problem with the field use of the new cell, but we should be able to design a cell to keep the proper amount of water in the gel.

Cells to provide turbulent mixing of the agent aerosol and the oxime aerosol have been designed. One of the cells is shown in the sketch attached to this letter. The inlet agent aerosol and vapor are pulled through a venturi to aspirate the oxime into the cell.

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The oxime aerosol and the agent aerosol must then move through the spiral path of the cell. Centrifugal force and the continuous flow of inlet agent cause the agent and oxime layer on the electrode to be very thin. The cell is operated with a high Reynolds number to produce turbulence and thorough mixing of agent and oxime. Because of this mixing and because the agent and oxime are both in aerosol form, this cell should give maximum area of contact between agent and oxime. Another cell similar in principle to this one was designed.

These cells were built in the Institute machine shop and were plated with platinum and silver by a local silversmith. The evaluation of these cells will be started during the last of May.

The experiments with the flash camera have been continued with about the same system described in the March and April reports. The image intensifier was added to the system, but very little increase in sensitivity was noticed. The difference between the measured increase and the predicted increase may have resulted from the following factors; (1) the vidicon response to very short exposures is better than we anticipated or (2) the phosphor in the image tube that we used did not store the image long enough to produce a significant gain. At this stage of the development it seems that the image tube will not be used.

Using 4X and 8X magnification with the objective lens, we have observed the 50 and 40 micron diameter particles that were sent by CRDL. We have also seen 25 and 10 micron diameter particles of aluminum oxide. In one of our latest experiments we observed a 5 micron quartz filament and some small particles of about the same size as the fiber. From these experiments, it would seem that the present camera is adequate for evaluation of the electronic counting circuits.

The most important work for May and June will be the test of the chemical cells and evaluation of the electronic counting circuits.

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May 17, 1963


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The project staff will be about the same during the next few weeks.

Yours very truly,

  
Alvin N. Bird, Jr.  
Research Physicist  
Instrument Development Section

Approved:

  
Robert Oglesby, Jr., Head  
Engineering Division

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